Harmful Algal Blooms: How Harmful? Potential Damage From an Ill-Advised Research and Action Plan

Testimony of Alex Avery, Director of Research and Education, Hudson Institute's Center for Global Food Issues to the U.S. House of Representatives, Committee on Resources, Subcommittee on Fisheries Conservation, Wildlife and Oceans

The Center for Global Food Issues has serious reservations about HR1856 IH because of the uncertain validity of some of the critical science underlying the bill and the size of the proposed expenditure.

The original bill, the Harmful Algal Bloom and Hypoxia Research and Control Act of 1998, was passed under the premise of a growing ecological/environmental crisis that justified a relatively large expenditure on a research and mitigation program. The overall premise was that excessive nutrient flows were causing increasingly frequent hypoxic (low oxygen) events in our coastal waters, especially in the Gulf of Mexico near the mouth of the Mississippi and along the Louisiana Gulf coast.

Careful examination of the evidence and supposed impacts, however, fails to support such a lavish short-term research and mitigation expenditure, especially as proposed in HR 1856 IH.

The so-called Gulf of Mexico "dead zone" that seasonally appears nearly every summer along the Louisiana and Texas coasts—the low-oxygen area estimated by Dr. Nancy Rabalais on the basis of a single research cruise each year since 1985—is a natural event that has likely occurred for eons. There are defined geographical and climatic patterns that ensure that such so-called "dead zones" occur naturally in many coastal waters in late summer months and no amount of intervention or research by man is likely to prevent them from occurring.

Moreover, there is sound research supporting the idea that nutrient fluxes from the land to coastal waters are vital to the high productivity and diversity of coastal fisheries. Dr. Churchill Grimes, laboratory director at the National Marine Fisheries Service's Southwest Fisheries Science Center stated in a 2001 paper "there is strong circumstantial evidence worldwide that nutrient-enriched riverine discharges enhance fishery production on adjacent continental shelves. This is also apparently the case with the Mississippi River where 70-80% of Gulf of Mexico fishery landings come from waters surrounding the Mississippi delta…. While riverine enhancement of fishery production seems clear, the exact mechanisms through which it occurs are not."

Since the controversy over the Gulf of Mexico's "dead zone" has erupted in the early 1990s—a period ostensibly of increasingly severe hypoxic events—not only have shrimp and fishery landings remained at or near historical highs, but a pod of more than 500 endangered sperm whales has established itself year-round in this very region. The sperm whales depend on the large populations of finfish and other higher-order marine species that thrive on the very abundance provided by the river's nutrients.

In addition to the clear but as-yet-unexplained correlation of nutrient-enriched riverine discharges and high coastal fisheries production, there is growing unease within the scientific community over the soundness of the science underlying the current Hypoxia Action Plan that calls for significant reductions in nitrogen (N) loadings into the Gulf via the Mississippi river.

We have been informed by credible sources that that there is currently a significant review effort underway at the Environmental Protection Agency that is uncovering some very poor science underlying the current plan. We have been told of gross errors in data analysis; suspicions of withheld and suppressed data; possible conflicts of interest among grant managers and recipients; inadequate management of grant funding; and consistent manipulation of both the science and the subsequent policy process in an attempt to reach a predetermined conclusion regarding the causes and culprits in Gulf of Mexico hypoxia.

All of these are serious charges that, given the large expenditure proposed in this Bill, should be thoroughly investigated.

According to credible sources, the current Hypoxia Action Plan targets the wrong nutrient entirely if the goal is to limit algae growth in Gulf coast waters—a goal that a growing number of fisheries scientists question. These sources contend the current plan is based on bad science that incorrectly implicates N instead of phosphorus (P) as the limiting factor in the growth of algae in the Gulf of Mexico.

According to these sources, the latest science indicates that N transport to the Gulf would need to be reduced by up to 90 percent in order to begin effectively limiting algae growth, an essentially impossible target. This is in stark contrast to the current Action Plant which targets a 20-30 percent N reduction.

Moreover, nutrient limits may well be the wrong goal, especially in the larger context of meeting humanity's food and fiber needs. Not only is there strong circumstantial evidence that nutrient fluxes via the Mississippi are key to the high fishery productivity in the Gulf of Mexico. The high agricultural production within the Mississippi watershed is virtually ignored in the current Action Plan, yet is vital to meeting U.S. and global food and fiber needs.

Pursuing the severe nitrogen reduction goals outlined in the current action plan would seriously limit the agricultural production potential of the Mississippi watershed and may in fact harm the productive capacity of the Gulf of Mexico as well. Moreover, the loss of production from the Mississippi basin could well lead to the clearing of additional tropical forest acres elsewhere to meet the rising food demands of a larger and more affluent population in tropical countries (i.e. India, Indonesia, Bangladesh, etc). This could inadvertently put thousands of species at risk.

In short, the current bill proposes significant spending on a research and action plan that is now in serious question, both scientifically and ecologically. As we have pointed out throughout this process, there is essentially no evidence that hypoxia as it currently occurs in the Gulf of Mexico is either growing in severity or is having significant ecologic or economic consequences.

This, coupled with the more recent and credible questions surrounding the scientific basis for the current Hypoxia Action Plan, suggest that the most prudent course for this committee would be to pursue more and sounder scientific data and to delay any action on this bill until the science regarding this issue is on a sounder footing that could better inform any policy decisions.

To act at this time, given the state of current knowledge, would be both premature and irresponsible.

Hypoxia, Nutrients, and Current Knowledge

The current research and action plan is predicated on the notion that hypoxia in the Gulf of Mexico and elsewhere is a growing problem that requires mitigation for both ecological and economic reasons. However, there are serious questions regarding each of these assumptions.

First, there is strong evidence that hypoxia is a natural phenomena in many places. Researchers at the Water Resources Research Institute at the University of North Carolina have stated that the hypoxic events seen in the upper Neuse River estuary would occur even in the absence of additional nutrient flows into the estuary because of the geophysical layout of the estuary, high organic matter levels in bottom sediments, and prevailing climatic and weather conditions that occur during summer months.

The evidence that hypoxia in the Gulf of Mexico is a growing problem comes from a once-per-year research cruise along the Louisiana and Texas coasts conducted by a team from the Louisiana University Marine Science Consortium. These cruises, conducted since 1985, seemed to indicate that the size of the seasonal hypoxic zone was increasing during the late 1980s and early 1990s.

However, hypoxia is a seasonal, transient phenomenon that occurs for a variable period during the late summer. The size, severity, and longevity of the hypoxic area in the Gulf vary with multiple independent factors, such as river flows, wind, weather, and water currents.

It is impossible to say with any confidence whether any year's single research cruise captured the so-called "dead zone" at its peak size. In some years, essentially no "dead zone" has formed. This was the case in 1988, apparently, when severe drought impacted the Mississippi watershed and reduced both water and nutrient fluxes to the Gulf.

Thus, it is wrong to assert that hypoxia is a "growing problem". This simply has not been demonstrated and cannot be concluded from the available data.

Second, there is scant evidence that hypoxia in the Gulf of Mexico is having any economic or ecological impacts. Most directly, fish landings from the Gulf of Mexico for Louisiana—the state that would be most affected by the seasonal hypoxic zone located primarily off of the Louisiana coast—have remained at or near historical highs throughout the period of supposed growing hypoxic severity. (See National Marine Fisheries Service data for fish and shrimp landings for Louisiana up to 2002, attached).

Moreover, there is essentially no reliable or predictable correlation between the estimated size of the seasonal hypoxic zone and fisheries and shrimp catch.

There is strong evidence that hypoxic areas have, in fact, existed seasonally in the Mississippi/Gulf coast region for centuries. Fish Jubilees, where fish leap onto shore in an attempt to escape low-oxygen waters, have been documented since the mid-1800s in the Louisiana and Gulf coast. Alabama researchers report that hypoxic events have been documented in Mobile Bay "since the mid-1800s." They add that "despite the frequency of these events [hypoxic conditions exist approximately 50 percent of the time], fisheries landings in Mobile Bay remain high and researchers are now addressing the question of whether such events (that may help maintain highly productive "pioneer" communities) may have a beneficial effect on secondary production in the ecosystem."

Is the hypoxic zone larger now than it was prior to the European settlement of the mid-West? Clearly, farming, industrial development and activities, land use changes, and changes to the river initiated by humans have increased nutrient fluxes to coastal waters. The conversion of forest into animal pastures and the breaking of the sod of the Great Plains each increased nutrient fluxes into coastal waters. How much nutrient flows into the Gulf have increased over the past century is still in debate within the scientific community.

The question that should be asked, however, is the magnitude of the increase and what its impacts have been. So far, there doesn't appear to be any significant negative impacts, either ecological or economic, from the changes in nutrient flux via the Mississippi into the Gulf of Mexico.

If there were, efforts to limit nutrient loads in the river could be a prudent approach. However, there is strong reason to believe that nutrient additions to the watershed are already being curtailed. While total synthetic nitrogen fertilizer applications within the Mississippi basin peaked in the mid-1980s, average corn yields in the basin have increased roughly 25 percent since that time. This would indicate that more of the nitrogen and phosphorus applied to cropland is being harvested in the crop, leaving less excess nutrients for transport to coastal waters.

In conclusion, there is little scientific or economic justification for the current Hypoxia Action Plan and expenditures outlined in HR 1856.

The bill calls for scientific assessments of the causes, consequences, and costs of harmful algae blooms. However, over the past decade large amounts of time, money and energy have already been expended by multiple government agencies conducting such assessments and their conclusions were actually quite clear. According to the Hypoxia Work Group's previous reports:

1. There is no discernable, measurable, or documented "detrimental ecological and economic effects" to the Gulf environment or its fisheries from hypoxia. (Topic 2, p. 52)
2. Such ecosystem disturbances in the shallow continental shelf as can be documented are as likely to be the result of trawling or "other sources of stress." (Topic 2, p. 50)
3. Even during the supposed extremes in hypoxic conditions in the Gulf, Louisiana's coastal fisheries have flourished, maintaining "energy flow to productive fisheries (crabs and shrimp) that depend on the bottom." (Topic 2, p. 9)

This flourishing of fisheries includes the establishment of a year-round pod of 500+ endangered sperm whales in the coastal waters surrounding the Mississippi delta.

Moreover, there is growing evidence that the current assessments and Action Plan are predicated on seriously flawed science. This issue in particular should be thoroughly addressed before any action on this bill is taken.

Finally, the proposed action of the previous Action Plan of a 30 percent reduction in nitrogen loads into the Mississippi would have significantly reduced agricultural productivity across the most productive swath of American farmland at a time when world food and feed demand is rising more rapidly than at any time in human history. Yet tropical forests with high natural biodiversity are already under increasing threat due to the expansion of farmland in the face of the increasing food and fiber demand.

NMFS Landings Query Results

You Asked For the Following:

- `Year            : From: 1970 To: 2002`
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- `Species         : ALL SPECIES COMBINED`
-
- `State           : Louisiana`
-

Year	Metric Tons	Pounds	$
1970	502,245.9	1,107,251,300	61,068,389
1971	630,877.3	1,390,832,000	71,945,397
1972	486,371.8	1,072,255,300	71,693,143
1973	466,552.6	1,028,561,800	94,626,584
1974	554,950.3	1,223,443,500	85,841,544
1975	505,714.4	1,114,898,000	86,028,363
1976	552,743.8	1,218,578,900	135,187,898
1977	412,775.1	910,003,900	136,169,114
1978	762,137.0	1,680,207,281	193,277,866
1979	696,597.1	1,535,717,937	208,862,895
1980	644,653.5	1,421,203,099	203,648,018
1981	537,751.4	1,185,526,794	205,580,429
1982	784,668.7	1,729,880,643	239,792,156
1983	861,851.6	1,900,037,928	242,077,866
1984	880,895.2	1,942,021,569	262,632,042
1985	781,126.0	1,722,070,287	241,827,157
1986	773,424.5	1,705,091,624	326,479,189
1987	842,910.0	1,858,279,455	337,594,348
1988	616,367.7	1,358,844,261	316,510,537
1989	561,124.4	1,237,054,770	271,559,271
1990	504,839.9	1,112,970,059	270,038,044
1991	548,059.4	1,208,251,759	268,099,859

1992	460,238.5	1,014,641,837	288,679,498
1993	588,193.8	1,296,731,997	266,608,644
1994	775,124.7	1,708,839,926	339,782,006
1995	511,919.2	1,128,577,118	315,833,002
1996	515,613.3	1,136,721,165	270,800,782
1997	646,777.9	1,425,886,505	317,152,354
1998	513,461.8	1,131,977,817	311,855,620
1999	691,612.3	1,524,728,384	336,963,461
2000	615,861.6	1,357,728,503	416,012,196
2001	541,405.1	1,193,581,629	342,399,791
2002	593,545.8	1,308,530,987	305,534,493
GRAND TOTALS:	20,362,391.4	44,890,928,034	7,842,161,956

NMFS Landings Query Results

You Asked For the Following:

- `Year            : From: 1955 To: 2002`
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- `Species         : SHRIMP, BROWN`
-
- `State           : Louisiana`
-

Year	Species	Metric Tons	Pounds	$
1963	SHRIMP, BROWN	12,330.4	27,183,600	6,204,322
1978	SHRIMP, BROWN	25,376.5	55,945,092	35,822,179
1979	SHRIMP, BROWN	19,751.5	43,544,237	53,660,411
1980	SHRIMP, BROWN	15,606.0	34,404,993	37,306,950
1981	SHRIMP, BROWN	26,033.3	57,392,972	50,267,849
1982	SHRIMP, BROWN	23,005.6	50,718,109	63,930,889
1983	SHRIMP, BROWN	18,110.0	39,925,384	55,510,427
1984	SHRIMP, BROWN	24,647.5	54,337,801	58,093,040
1985	SHRIMP, BROWN	25,378.0	55,948,367	46,563,483

1986	SHRIMP, BROWN	28,468.1	62,760,689	68,818,756
1987	SHRIMP, BROWN	26,443.0	58,296,288	78,688,116
1988	SHRIMP, BROWN	23,799.2	52,467,622	68,936,672
1989	SHRIMP, BROWN	25,030.1	55,181,298	64,985,876
1990	SHRIMP, BROWN	32,487.9	71,622,853	71,039,376
1991	SHRIMP, BROWN	19,932.0	43,942,110	53,040,606
1992	SHRIMP, BROWN	18,257.9	40,251,413	57,721,719
1993	SHRIMP, BROWN	18,417.5	40,603,125	43,931,558
1994	SHRIMP, BROWN	16,131.0	35,562,392	57,171,391
1995	SHRIMP, BROWN	20,422.6	45,023,769	61,201,539
1996	SHRIMP, BROWN	23,324.0	51,420,083	61,837,922
1997	SHRIMP, BROWN	19,566.9	43,137,080	67,213,611
1998	SHRIMP, BROWN	22,743.7	50,140,696	54,985,093
1999	SHRIMP, BROWN	26,538.4	58,506,585	63,132,470
2000	SHRIMP, BROWN	28,175.4	62,115,420	96,514,340
2001	SHRIMP, BROWN	28,714.0	63,302,987	90,520,847
2002	SHRIMP, BROWN	23,897.8	52,685,041	60,478,249
GRAND TOTALS:	-	592,588.2	1,306,420,006	1,527,577,691